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# QUEENSLAND
## REGIONAL EXPERIMENT STATION, BILOELA
## PROGRESS REPORT FOR THE SEASON 1952-53

BY

R. W. PETERS.

### Introduction.

This summary has been prepared from the reports submitted by the staff of the Biloela Regional Experiment Station.

*Meteorology.*

The total rainfall received during the period July 1952-June 1953 inclusive was 29·72 inches, as compared with the annual mean of 27·86 inches.

Winter rainfall was above the average, May and June being particularly good, but July and August were comparatively dry. A useful rain group yielding 1·55 inches occurred at the end of September, followed by another of 3·67 inches spread over nine wet days in October. Good rains in November and early December stimulated rather rank growth in most experiments. Fortunately, the hot dry weather which lasted until mid-January controlled plant growth sufficiently to force the development of a heavy crop. Above average rains in late January, supplemented by ample February and March rains, supplied sufficient moisture to meet the crop's requirements, while a dry autumn provided ideal harvesting conditions.

Maximum and minimum temperatures recorded during the year remained close to the average, the maximum being slightly below and the minimum slightly above, except for May and June when colder than normal conditions were experienced. The first frost occurred on 15th May and a cold snap coming at the end of the third week gave nine consecutive frosts, the highest number ever recorded in May. In June, sixteen frosts were recorded.

The monthly climatological data are presented in Table I.

Table 1.

| *Month* | *Rainfall in inches* | | *Screen Maximum Temperature (°F)* | | *Screen Minimum Temperature (°F)* | |
|---|---|---|---|---|---|---|
| | 1952-53 | 1925-53 *Means* | 1952-53 | 1925-53 *Means* | 1952-53 | 1925-53 *Means* |
| July, 1952 | ·59 | 1·30 | 71·4 | 70·9 | 41·2 | 40·1 |
| August | ·65 | ·61 | 74·5 | 74·7 | 45·0 | 40·6 |
| September | 2·00 | ·97 | 79·4 | 80·3 | 48·8 | 46·3 |
| October | 3·67 | 1·94 | 82·4 | 85·1 | 57·9 | 54·8 |
| November | 4·21 | 2·88 | 90·2 | 88·8 | 63·5 | 60·5 |
| December | 3·99 | 3·30 | 92·0 | 90·6 | 63·7 | 64·3 |
| January, 1953 | 6·74 | 4·32 | 85·8 | 91·6 | 67·1 | 66·9 |
| February | 4·55 | 4·85 | 86·7 | 89·1 | 66·6 | 66·2 |
| March | 2·29 | 2·75 | 85·4 | 87·6 | 61·8 | 62·7 |
| April | ·20 | 1·65 | 86·5 | 83·0 | 58·1 | 54·6 |
| May | ·61 | 1·62 | 76·7 | 77·0 | 43·6 | 47·1 |
| June | ·22 | 1·67 | 74·7 | 71·3 | 36·9 | 42·8 |
| Total | 29·72 | 27·86 | 82·1 | 82·5 | 54·5 | 53·9 |

*Crop Growth.*

The season under review was suitable for the production of good yields of cotton. A total planting of 38·76 acres of irrigated and rain-grown cotton was carried out between 11th and 15th October. The depth of moist soil at planting ranged from 2-3 feet in areas previously cropped with cotton, to 4 feet in winter fallows following Rhodes grass.

High temperatures and ample moisture resulted in rapid growth by the cotton during November. All cotton was thinned between 3rd and 21st, some by hand and some mechanically. Heavy weed germination necessitated repeated inter-row cultivation until the crops were "layed by". Good growing conditions continued through December, accompanied by severe attacks by *Heliothis* which caused considerable loss of crop, the combination resulting in the stimulation of vigorous growth of plants on all old cultivations.

Fairly heavy flowering occurred during the first two weeks of January, but during the third week of continuous dry weather slight stress conditions operated in some areas and the flowering rate dropped appreciably. Flowering continued throughout February, the rate varying according to variety, soil type and moisture factors, but by the end of the month it had practically ceased in all cotton.

Irrespective of variety, cotton growing on land in its first year following Rhodes grass generally produced a heavy crop of bolls which appeared to open earlier than comparable plantings on older cultivations. Warm dry conditions during the first three weeks of March were conducive to the opening of bolls, and hand picking commenced in the most advanced crops on 16th March and mechanical harvesting during the second week of April. First pick yields varied from 400 lb. seed cotton per acre in areas cropped to cotton continuously, to 1,600 lb. in outstanding varieties in varietal trials following grassland.

Climatic conditions for harvesting were ideal. The usual difference between irrigated and dry farmed cotton was not apparent this year, owing to the ample and regular rainfall. Table 2 briefly summarises the results from all cotton trials on the Experiment Station for the 1952-53 season. The total area of cotton at the Station was 38·76 acres which produced 21,900 pounds of lint, the average lint percentage being 38·4.

TABLE 2.

| *Crop* | *Planting Dates* | *Picking Dates* | *Local Close Season* | *Rain-fall 1.7.52-30.6.53* | *Mean Temper-ature Oct.-Nov.* | *Mean Yield Lint per acre* |
|---|---|---|---|---|---|---|
| Raingrown cotton | Oct. 11-15 | March 16-June 18 | Nil | 29·72 | Max. 86·9° F. | 583 |
| Irrigated cotton | Oct. 11-15 | March 16-June 18 | Nil | 29·72 | Min. 60·7° F. | 525 |

*Pests.*

Careful watch was kept for *Heliothis* activity following germination and it was found that towards the end of November egg counts commenced to rise steeply. The whole cotton crop was sprayed on 29th November, using a "Rulene" mixture containing 0·4% DDT active ingredient at the rate of 30 gallons per acre.

Further *Heliothis* activity, as indicated by high egg counts, was again evident around the middle of December, and a second spraying of all cotton was carried out on 19th and 20th December, using the same concentration with an increase in rate to 40 gallons per acre. This was considered necessary to give a satisfactory coverage of the plants, which had grown considerably since the earlier spraying.

Towards the end of December yet another heavy egg laying took place necessitating a third spraying at the same rate and strength as the last. At no time in January did laying warrant spraying and what had proved a long serious attack petered out.

Aphids were present during December but not in numbers large enough to warrant control measures.

During December a heavy breeding of harlequin bugs took place, but the late December spraying killed a great proportion of this pest.

## Agronomic Trials.

*Time of Watering Trial.*

This experiment (3 × 6 randomised block design) embraced a comparison of the standard irrigation time-table A (watering mid-October and January onwards as required) with the two most promising time-tables described in previous Annual Reports. These were C (as for A with additional irrigation in mid-November) and E (as for C with additional irrigation in mid-September).

The E plots were given the first 3″ spray irrigation on 22nd September, and following good rains, which made the mid-October irrigation unnecessary, the whole experiment was planted on 14th October, when the depth of soil moisture at field capacity was 35 inches in the E plots and 27 inches in the A and C plots. Good growing conditions during November and the loss of the first squares through insect attack made it inadvisable to irrigate any of the treatments during that month. Consequently, for the current season the A and the C treatments were identical, each of them receiving one irrigation in mid-January.

Owing to a serious attack by *Heliothis,* cotton bushes were almost devoid of squares in mid-December and it was not until nearly the end of the month that flowering commenced at a slow rate. No differences could be seen in growth between the three treatments and the average height of the plants at the end of the month was 30-34 inches.

By 9th January, plants were again squaring well. The E plots tended to ranker growth than the A and C plots. Borings taken on 13th January showed that the top 18 inches of soil was dry and a 3 inch irrigation was given to the whole area on 14-15th January. Flowering continued at a moderate rate until the end of February.

Boll formation was good throughout February and bolls were commencing to open towards the end of the month. Sufficient cotton was open at the end of March to allow a first pick, which was carried out by the mechanical harvester. The second and final pick was made on 5th June. Yields in terms of lb. lint per acre are shown in Table 3.

TABLE 3.

| *Treatment* | *First Pick* | *Second Pick* | *Total* | *Significantly exceeds* 5% | 1% |
|---|---|---|---|---|---|
| E. 3″ irrigation mid-Sept. 3″ irrigation mid-Jan. | 535·4 | 100·2 | 635·6 | C.A. | C.A. |
| C. 3″ irrigation mid-Jan. | 462·4 | 95·6 | 558·0 | A | |
| A. | 431·8 | 87·4 | 519·2 | | |
| Average | 476·5 | 94·4 | 570·9 | | |

The results substantiate results of previous years where mid-September pre-planting watering has proved beneficial.

*Irrigation Rotation Trial.*

This trial (5 × 4 randomized block design) was continued during the season under review, the rotation cropping being as follows: —

A. Green panic grass
B. Sorghum
C. Cotton continuous
} irrigated.

R. Green panic grass
S. Grain sorghum
} non-irrigated.

Owing to good planting rains, no pre-planting irrigation was necessary and the experiment was planted on 14th October when the depth of moisture approximated 38 inches. Germination in the cotton plots was good, and at the end of the month plants were 6 inches tall. No differences were noticed between any of the three treatments up to the end of November.

Thinning was carried out on 11th November when the plants were 9-12 inches tall. Cotton grew vigorously throughout the month, but *Heliothis* activity seriously reduced squaring and subsequent flowering and necessitated the application of three "Rulene" sprayings during the month of December.

Owing to faulty germination, the green panic plots (A and R) were recultivated and replanted with green panic in late February, and a good germination resulted.

The grain sorghum plots (B and S) were attacked so severely by grasshoppers that only 7 inches of bare stalk remained. Spraying with 0·4% DDT gave a good control and by early January a fair regrowth had occurred.

In C plots (continuous cotton) flowering increased steadily until the last week of January when a reduction in rate was brought about by wet weather. Cotton continued flowering at a slow rate until the end of February. Boll formation was good throughout that month and some bolls were commencing to open at the end of the month.

The first picking was made during the period 7-13th April, an average yield of 475 lb. lint per acre being obtained. The second and final pick, carried out on 5th June, yielded 94 lb. lint—a total of 569 lb. per acre.

*Irrigated Cotton Varietal Trial.*

This trial (6 × 4 randomized block design) was planted on 15th October, and a good germination was obtained. Subsoil moisture was present to a depth of 38 inches at the time of planting. A very rapid early growth developed in all varieties and thinning was carried out within a month of planting. During the latter part of the month plants were heavily infested with *Heliothis* eggs, counts as high as 80 eggs per 100 plants being noted. On 29th November the area was sprayed with "Rulene" at the rate of 20 gallons per acre of 0·4% DDT.

Plant growth during December was very rapid in all varieties and at this stage terminal loss averaged 50% while counts indicated a plant stand of 91 per 100 feet of row. Flowering commenced in all varieties during the last week of December and flower counts were taken during January except for the week ending 23rd, when heavy rain limited observations.

Details of flower counts per 100 feet of row are shown in Table 4.

TABLE 4.

| *Week Ended* | *Miller* 41S | *Miller* 43.9.0 | *Empire* | *Acala* 4.42 | *Coker* 100 | *Stoneville* 2B | *Means* |
|---|---|---|---|---|---|---|---|
| 2.1.53 | 39 | 24 | 85 | 45 | 69 | 27 | 48 |
| 9.1.53 | 39 | 30 | 76 | 41 | 79 | 15 | 47 |
| 16.1.53 | 123 | 125 | 268 | 185 | 213 | 85 | 167 |
| 23.1.53 | — | — | — | — | — | — | — |
| 30.1.53 | 218 | 217 | 197 | 166 | 177 | 166 | 190 |
| Totals | 419 | 396 | 626 | 437 | 538 | 293 | 452 |

The wet conditions prevailing during the last week of January suppressed flowering early in February but by the end of the month an appreciable opening of bolls had taken place. Coker 100 and Empire were the first varieties to open, followed by Acala 4.42 and Miller 41S, while Miller 43.9.0 and Stoneville 2B were later maturing,

the bushes being large and vegetative. At this stage the plots of Coker and Empire were most attractive, both showing nice type plants and a large quantity of open bolls.

Relatively dry weather was experienced throughout April and these conditions allowed excellent boll opening of the cotton in all varieties. The area was harvested with the mechanical picker on 29th and 30th April, yields ranging from 1,639 pounds seed cotton from Coker to 1,045 pounds from the lowest yielder—Acala 4.42. Generally the cotton in this area was suitable for mechanical harvesting and the picker proved relatively efficient in all varieties.

A second and final pick was carried out by the mechanical harvester on 11th and 12th June. These final yields were comparatively small.

Table 5 gives the overall yields for each variety in this trial in terms of lb. lint per acre.

TABLE 5.

| *Variety* | *First Pick* | *Second Pick* | *Total* | *Significantly exceeds* 5% | 1% |
|---|---|---|---|---|---|
| E. Coker 100 | 644·9 | 70·1 | 715·0 | F C B A D | F C B A D |
| F. Stoneville 2B | 574·3 | 64·6 | 638·9 | B A D | B A D |
| C. Empire | 530·4 | 66·1 | 596·5 | D | D |
| B. Miller 43.9.0 | 499·3 | 66·1 | 565·4 | D | D |
| A. Miller 41S | 494·7 | 65·0 | 559·7 | D | D |
| D. Acala 4.42 | 422·1 | 62·0 | 484·1 | | |
| Average | 527·6 | 65·7 | 593·3 | | |

Coker 100 led as in last year's trial; Stoneville 2B, which was in 5th position last year, but previously had been among the leaders in irrigation trials, redeemed itself again by gaining second position. As in last year's trial the early maturing varieties yielded highest.

*Dry Land Cotton Varietal Trial.*

This trial (10 × 4 randomized block design) was planted on 11th October on land in the first year following four years of Rhodes grass pasture. The depth of moisture at field capacity was 38 inches at the time of planting. A good germination resulted, early growth was rapid and thinning was carried out on 10th November when the plants were 6-8 inches tall.

Squaring commenced during the first week of December and by the middle of the month an occasional flower was noted, followed by a general flowering by the end of December when the first flower counts were made.

Good growth was made during the first half of January but slight stress conditions were evident between 12th and 19th which caused the loss of some squares and young bolls. Cotton flowered continuously throughout January and flower counts were made regularly. The total number of flowers (per 100 foot row of approximately 1 ft. plant spacing) that opened during January are shown in Table 6.

TABLE 6.

| *Variety* | *No. flowers per 100 ft. row* |
|---|---|
| Rogers Acala | 1144 |
| Rowden 70 | 1116 |
| Miller 43.9.0. | 1047 |
| Acala 4.42 | 1018 |
| Miller 418 | 943 |
| MBC 8 | 933 |
| New Mexico Acala | 922 |
| Miller 610 | 867 |
| Empire | 861 |
| Acala 5675.10.2 | 765 |

A few bolls opened at the end of the month and only light flowering took place during February, which ceased by the middle of the month. Cotton continued to open in sufficient quantity to warrant a first pick which was commenced on 16th March by hand pickers. The bushes were generally of the desired type with a minimum number of diseased bolls. Yields ranged from 1,275 pounds of seed cotton per acre from Empire to 999 from Acala 4.42, which gave the lowest return.

The second and final pick was harvested mechanically as shown in Table 7 in terms of lb. lint per acre.

TABLE 7.

| *Variety* | *First Pick* | *Second Pick* | *Total* | *Significantly exceeds* 5% | 1% |
|---|---|---|---|---|---|
| B. New Mexico Acala | 474 | 228 | 702 | E F G H I J | I J |
| A. Miller 43.9.0. | 462 | 233 | 695 | E F G H I J | H I J |
| C. Empire | 491 | 186 | 677 | H I J | |
| E. Miller 610 | 449 | 214 | 663 | | |
| D. Rogers Acala | 448 | 194 | 642 | | |
| H. Acala 5675.10.2 | 476 | 147 | 623 | | |
| F. Acala 4.42 | 388 | 234 | 622 | | |
| G. Miller 418 | 409 | 189 | 598 | | |
| J. MBC.8 | 421 | 169 | 590 | | |
| I. Rowden | 365 | 197 | 562 | | |
| Average | 438 | 199 | 637 | | |

The average total yield of the dry land varietal trial exceeded that of the irrigated varietal trial by 44 pounds of lint per acre, thereby demonstrating the good cotton season.

## MECHANICAL HARVESTING INVESTIGATIONS.

Plant growth was vigorous in most experiments throughout most of the season, with the result that large bushes developed, except on land in the first year after Rhodes grass. In addition, the early severe attacks of *Heliothis* caused appreciable loss of terminals and shedding of a considerable number of squares which under the good moisture supply tended to promote excessive vegetative growth. Considering these conditions the machine harvesters picked moderately well.

However, an efficiency of between 86% in the irrigated trial and 83·5% in the dry land trial constitutes a heavy loss in such high yielding crops. The data collected from the experiments indicate that such factors as cotton dropping from the bushes when the machine jarred the plants, and the rank vegetative growth preventing the spindles contacting efficiently considerable cotton, contributed largely to such losses. Apparently, under such dry harvesting conditions it is advisable to make the first picking of vegetative crops before the cotton in the lower bolls is detached from the burr too easily. It is interesting to note that the varietal order of merit for the first four places was similar in both the irrigated and non-irrigated machine harvesting trials.

*Irrigated Cotton Varietal Trial—Machine Harvested.*

This trial was planted on 14th October in non-replicated 8 row plots of 11 varieties. Moisture at field capacity was present in the soil to a depth of 33 inches at the time of planting. A fair to good germination occurred in all plots except Rowden, which was replanted to Miller 41S.

During the early stages the plants grew steadily and on 11th November the trial was hand thinned to 1 ft. spacing. By 16th December the plants were 21-24 inches tall.

The cotton grew steadily during January. Soil moisture determinations on 12th January showed that the top 20 inches of soil were dry and a 3″ spray irrigation was applied on 16th January. This irrigation was followed by 5·72 inches of rain during the last week of January. This abundance of water caused vegetative growth which ultimately resulted in bushy plants, which are not desirable for mechanical harvesting. Another factor contributing to bushy plants was the high terminal loss due to early *Heliothis* attack.

A few bolls started to open on 13th March, and by the end of the month considerable cotton had opened in some varieties. When the first pick was made on 27-28th April most of the bolls had opened. A second and final pick was made on 12th June.

Terminal loss counts taken in December showed an average of 32% lost. The overall yields and efficiencies of the machine are shown in Table 8. The gleanings and yields used in these determinations were as follows: —

W = Total machine pick in pounds seed cotton per acre.
X = Cotton left on ground after first pick in pounds per acre.
Y = Cotton left on ground after second pick in pounds per acre.
Z = Cotton left on bushes after second pick in pounds per acre.

$$\text{Efficiency} = \frac{W \times 100}{W + X + Y + Z}$$

Overall yields and efficiencies are shown in Table 8 in terms of seed cotton per acre.

TABLE 8.

| Variety | Lost on Ground by Machine | | Left on Bushes after 2nd Pick | Total Loss due to Machine | Total Yield | Potential Yield | Efficiency |
|---|---|---|---|---|---|---|---|
| | First Pick X | Second Pick Y | Z | X+Y+Z | W | | % |
| Acala 4.42 | 47 | 10 | 62 | 119 | 1032 | 1151 | 89·66 |
| N.M. Acala | 57 | 31 | 62 | 150 | 1278 | 1428 | 89·50 |
| Miller 43.9.0 | 73 | 31 | 52 | 156 | 1311 | 1467 | 89·37 |
| Empire | 83 | 10 | 73 | 166 | 1360 | 1526 | 89·12 |
| Coker 100 | 114 | 10 | 114 | 238 | 1822 | 2060 | 88·45 |
| Rogers Acala | 83 | 31 | 52 | 166 | 1206 | 1372 | 87·90 |
| Acala 5675.10.2 | 99 | 10 | 62 | 171 | 1227 | 1398 | 87·77 |
| Stoneville 2B | 156 | 31 | 83 | 270 | 1619 | 1889 | 85·71 |
| Miller 41S | 145 | 62 | 93 | 300 | 1431 | 1731 | 82·67 |
| Triumph | 104 | 52 | 135 | 291 | 1041 | 1332 | 78·15 |
| MBC.8 | 78 | 41 | 156 | 275 | 997 | 1272 | 77·77 |
| Means | 94 | 29 | 87 | 209 | 1302 | 1511 | 86·01 |

*Dry Land Cotton Varietal Trial—Machine Harvested.*

This trial was planted on 11th October in non-replicated 10 row plots of 10 varieties. Moisture at field capacity was present in the soil to a depth of 29 inches at planting.

A fair to good germination was obtained in all varieties except Rowden, which was replanted to Miller 41S. Nitrate samples taken immediately following planting showed an average of 3·3 p.p.m. of available nitrates present. All varieties made rapid growth and thinning took place between 7th and 11th November.

General squaring commenced during the last week in November and the first crop was attacked by *Heliothis*. Dry conditions in early January caused severe wilting and some further shedding took place. Isolated flowers were observed about mid-December, but general flowering in all varieties did not commence until the last week of that month. The main flowering period was from late December to the third week in January, although some late flowering was observed in all varieties early in March.

Isolated bolls were opening in all varieties by mid-February and by the end of March considerable cotton was open, particularly in the Miller and Empire varieties.

Warm dry weather during April arrested the maturity of the crop and this area was machine harvested on 22nd-24th April. The second and final pick was carried out in this area between 16th and 18th June. Prior to the second pick, severe frosts had been recorded in late May and early June. Consequently the sample picked contained much dead leaf. The yields and efficiency of the machine are shown in Table 9 in terms of lb. seed cotton per acre.

Table 9.

| Variety | Lost on Ground by Machine | | Left on Bushes after 2nd Pick | Total Loss due to Machine | Total Yield | Potential Yield | Efficiency |
|---|---|---|---|---|---|---|---|
| | First Pick | Second Pick | | | | | |
| | X | Y | Z | X+Y+Z | W | | W×100% / W+X+Y+Z |
| Miller 43.9.0 | 129 | 50 | 69 | 248 | 1776 | 2024 | 87·7 |
| Acala 4.42 | 98 | 71 | 47 | 216 | 1490 | 1706 | 87·3 |
| Empire | 119 | 87 | 103 | 309 | 1880 | 2189 | 85·9 |
| N.M. Acala | 124 | 132 | 71 | 327 | 1931 | 2258 | 85·5 |
| Rogers Acala | 138 | 82 | 42 | 262 | 1333 | 1595 | 83·6 |
| Miller 41S | 127 | 127 | 79 | 333 | 1671 | 2004 | 83·4 |
| Miller 610 | 167 | 140 | 90 | 397 | 1745 | 2142 | 81·5 |
| Acala 5675.10.2 | 119 | 158 | 90 | 367 | 1385 | 1752 | 79·0 |
| MBC.8 | 148 | 137 | 108 | 393 | 1357 | 1750 | 77·5 |
| Means | 129 | 109 | 78 | 316 | 1619 | 1935 | 83·5 |

## Cotton Breeding.

The refinement by selection of the jassid resistant back-cross Miller strains has been continued. The progeny plot was planted on 15th October and plant growth was vigorous until December, when slight stress conditions were noticed and a 3″ spray irrigation was applied. The plot yielded well, the average yield being at the rate of 2,471 pounds of seed cotton per acre.

Three acres of progeny increases planted for seed multiplication yielded at the rate of 2,632 pounds of seed cotton per acre, the highest yield being 2,987 pounds of seed cotton per acre from MBC.8.6.1. The lowest progeny yielded at the rate of 2,118 pounds seed cotton per acre.

## Entomological Investigations.

To examine the results of various concentrations of DDT, two trials were laid down, one under irrigation and the other dry land. No significant differences were obtained, but it would appear that the stronger concentrations tended to retard the opening of the bolls and that the better control was obtained from 2 pints of "Rulene" per acre.

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